

Development of the surface reflectance Fundamental Climate Data Record from the Landsat archive, the LDCM mission and future Landsats

**Principal Investigator
Dr. Eric Vermote
NASA GSFC Code 619**

**Co. P.I.
Dr. Chris Justice
Department of Geographical Sciences
University of Maryland**

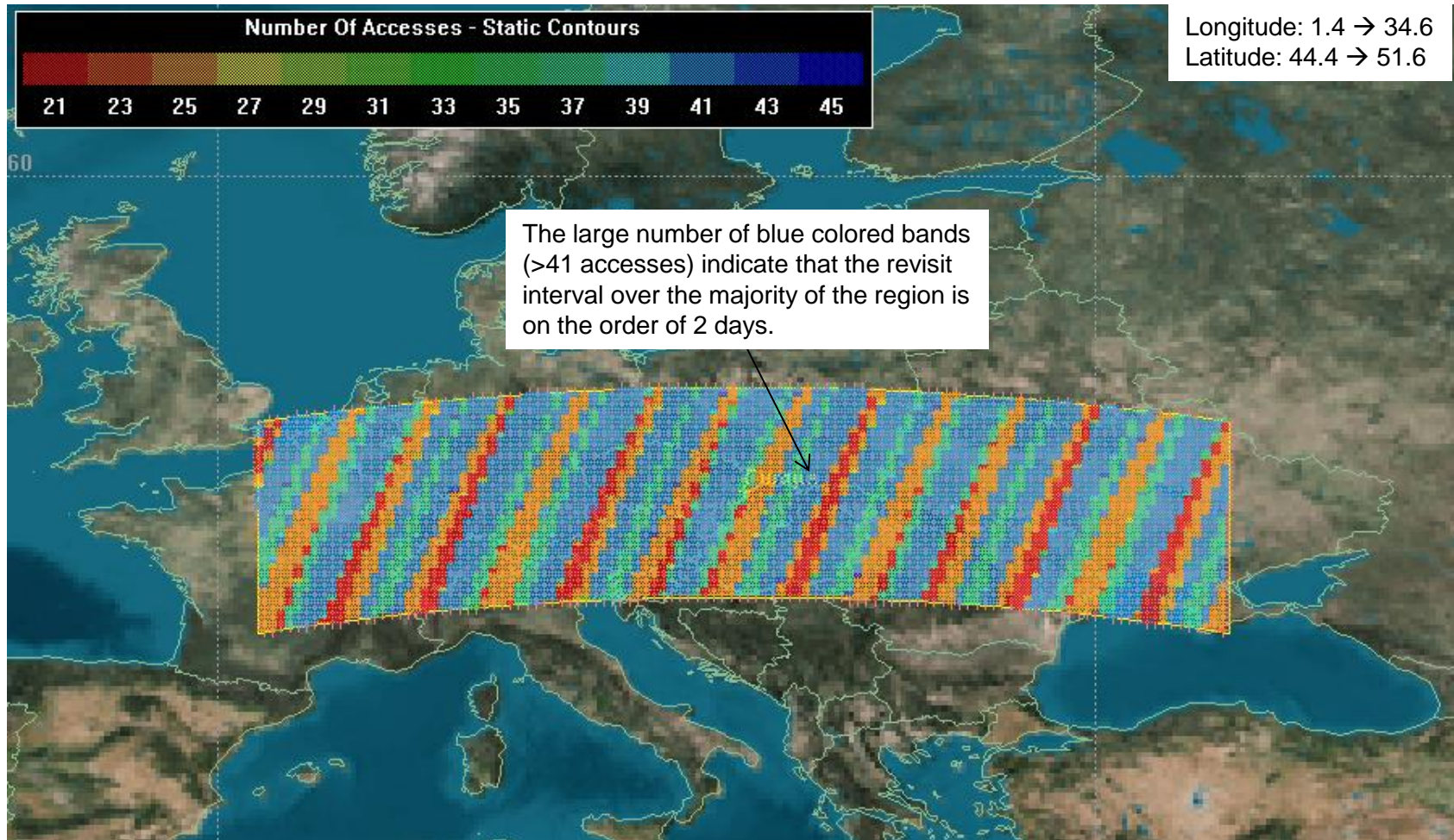
**Collaborators
Dr. Richard Santer
University of Littoral, Wimereux, France**

**Olivier Hagolle
CESBIO-CNES, Toulouse, France**

Objectives

- to provide an algorithm and code for a Surface Reflectance Standard Product for integration into the LDCM processing system.
- to validate the resulting LDCM product, using data from AERONET
- to provide a cloud masking and cloud shadow screening algorithm for LDCM
- to undertake vicarious calibration of the LDCM instrument
- to advise on and contribute to the LDCM program outreach and explore the potential synergy with other high resolution international earth observation programs (e.g. through the LCLUC, GLAM GOFC/GOLD and IGOL programs).
- to be an active contributor to the LDCM Team, participating in telecons, science team meetings and working groups as appropriate.
- ***Explore in particular the possibility to create a fused surface reflectance product from LDCM and Sentinel 2 (prototype with Formosat data and SPOT4 –Take 5 experiment).***

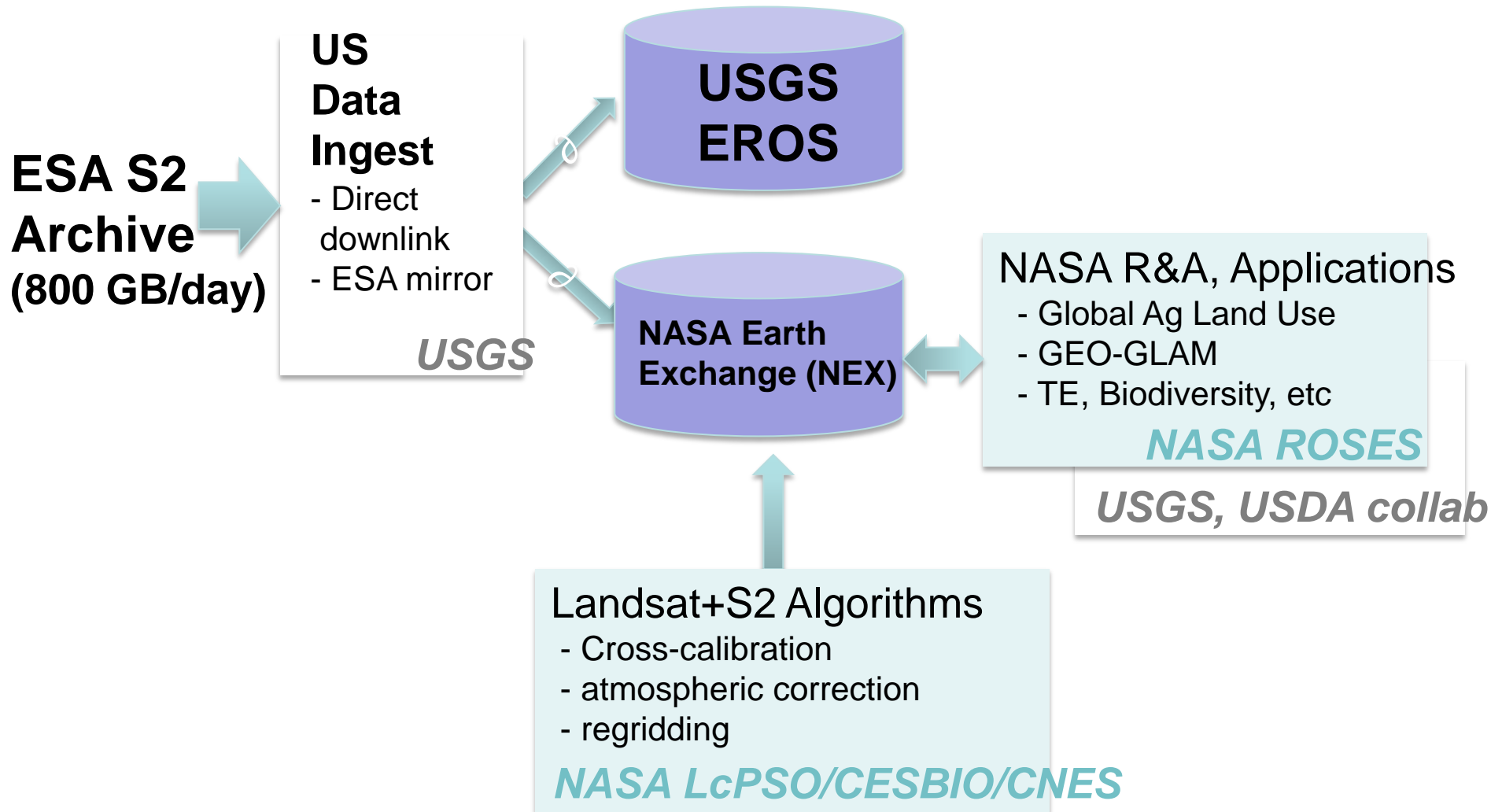
Sentinel 2A and B - LDCM Europe



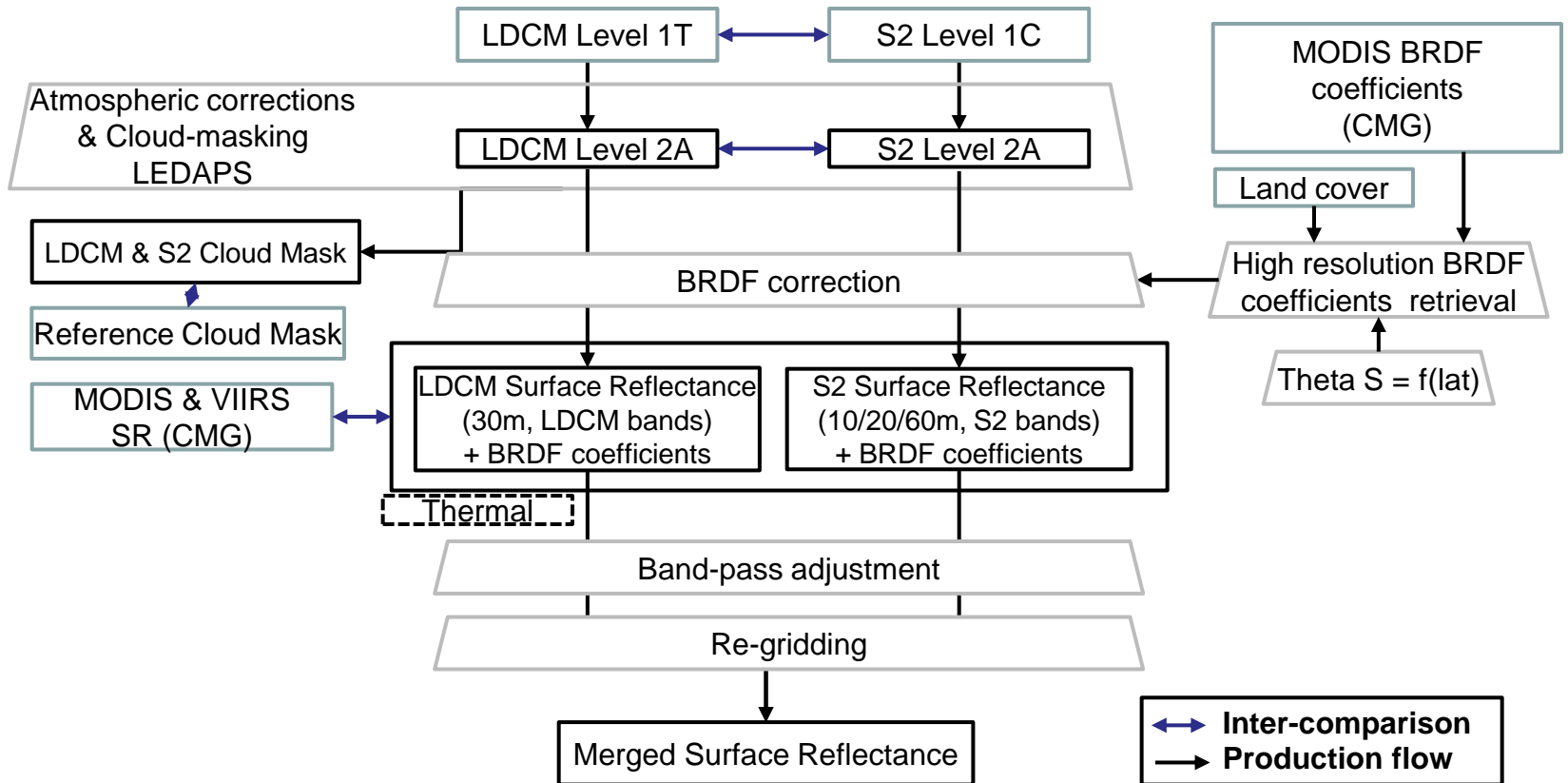
- The picture shows the number of times LDCM and the Sentinel 2 satellites accessed areas on the ground over an 80 day period of time.
 - 21 accesses indicates a maximum revisit interval of ~3 days 19 hours
 - 46 accesses indicates a minimum revisit interval of ~1 day 18 hours

Courtesy Brian Killough, NASA LARC

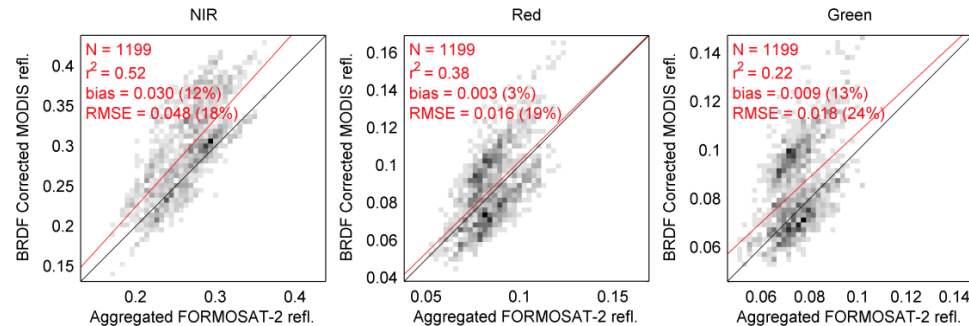
Proposed Sentinel-2 / Landsat Architecture



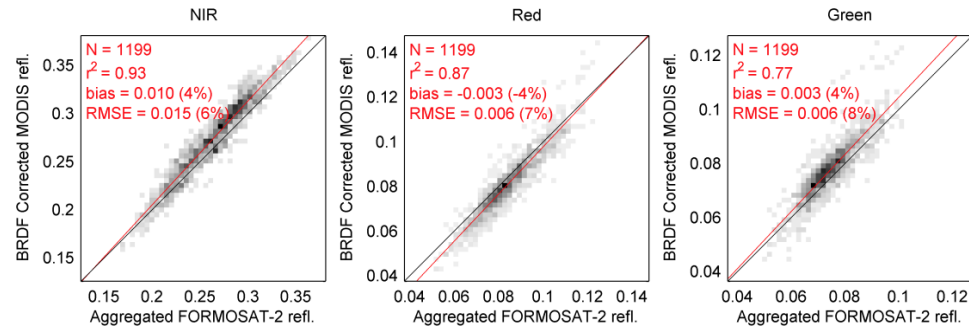
LDCM / Sentinel-2 Fusing



Cross-comparison of MODIS SR with product derived using independent approach 1/2

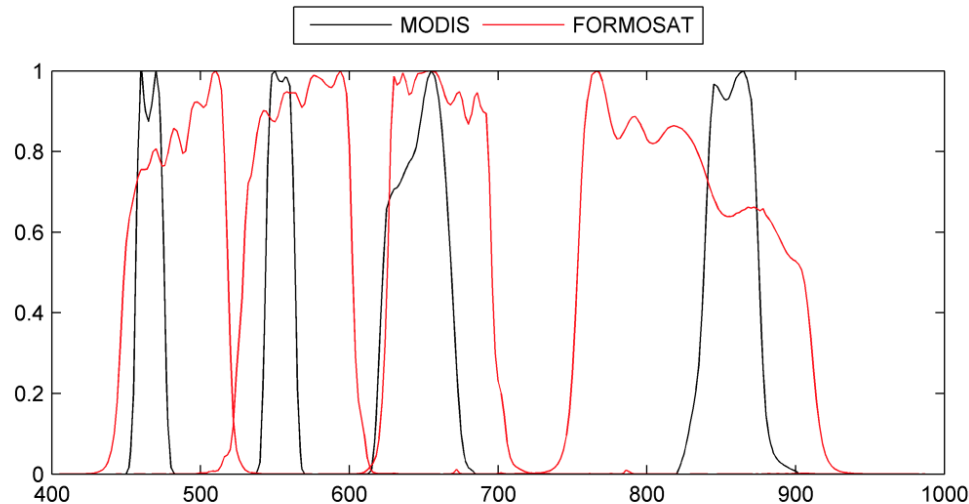


Comparison of aggregated FORMOSAT-2 reflectance and MODIS reflectance. No BRDF correction. Density function from light grey (minimum) to black (maximum); white = no data.

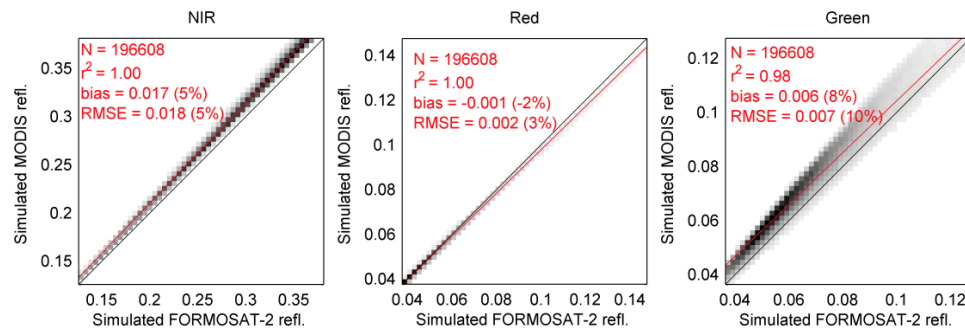


Comparison of aggregated FORMOSAT-2 reflectance and BRDF corrected MODIS reflectance. Corrections were performed with Vermote al. (2009) method using for each day of acquisition, the angular configuration of FORMOSAT-2 data.

Cross-comparison of MODIS SR with product derived using independent approach 2/2



Spectral Bands of MODIS and FORMOSAT-2



Comparison of simulated FORMOSAT-2 and MODIS reflectance performed with PROSAIL model. The simulated dataset is the same as the one described in Baret et al. (2007).

SPOT-4 Take five

- Data every 5th day
- Constant View Angle
- 4 spectral bands (b, g, r, nir)
- 4 months: February – May
- 42 sites (worldwide, mostly in France)
- 2 US Ag sites funded by NASA:
 - Southern Great Plains (OK, USA)
 - Maricopa (AZ, USA)
- All data free

